FILM 77

COMPUTERS IN THE FILM INDUSTRY

The Computerised Studio

SYNOPSIS

The fast developing power, and decreasing cost of computer hardware allows us to assume that anything that is technically feasible now may be economically available in the near future.

For the film maker, it is convenient to consider the applications of computers under the three headings of Technical, Creative and Managerial.

TECHNICAL

This covers: numerical control of machinery and devices during the production stages. Typical examples include: processing, rostrum camera controllers, studio lighting, scene shifting, model animation etc.. The computers are usually dedicated machines for one particular job. This application is now becoming common, and considering that so much film equipment is based upon the same mechanical principles, it is likely that computers will find a new market here.

CREATIVE

The main argument against computers in the film industry is that they reduce creativity. The argument usually quotes technical 'Experimental' films as being sterile, indulgent, and having little application to the mainstream of film making. This argument limits the application to films produced by computers, but by considering the computer as an aid to creativity, it becomes a very powerful tool in creative decision making.

For the Writer, Word Processors will take much of the effort out of writing

a script - particularly when it has to be changed continuously, and distributed to a number of people in different formats (actors, cameramen, editors etc.).

For the Director, it will eventually be possible to rehearse a film by simulating camera shots, movements, angles and locations on the computer display, and so get ideas on timing and viewpoints worked out prior to the actual production.

For the Designer, studio sets can be simulated on the screen, and blue-prints for scale models drawn out automatically. This will add considerably to the use of models and effects.

For the Musician, the sound synthesiser can create a whole orchestral effect. Digital sound analysers will allow music to be manipulated in length and character to suit the image, and be registered to this automatically.

For the Editor, sound effects can be created directly. Sound tracks of voice, music and effects will be stored and edited within the computer.

For the Animator, libraries of typography will allow credits and titles to be instantly created. Technical drawings - particularly in 3D - will be generated and animated in colour directly on the display. Hard copy drawn onto cel is needed to match with live-action. Lasers will cut out characters for the Cut-out style of animation.

For the Cameraman, the numerically controlled camera will allow an infinite range of movements. Allied to this will be a video camera that will allow instant playback of shots, plus the addition of a colour synthesiser which will allow the animation to be given effects directly.

For the Choreographer, the computer will simulate and suggest dance patterns to a given musical beat.

For the actor, a range of voices would come from the addition of voice

and sound synthesisers, in much the same way as electronics are added to instruments now.

MANAGERIAL

Oxford English Dictionary defines a manager as a controller, or decision maker. Now obviously managers do not spend all their working days making decisions, they too have executive and administrative responsibilities. How can the computer help the manager? Basically in two ways: Conceptual mathematical models of decision making situations can be readily handled by modern computers. Computers also have a more mundane (and possibly more valuable) role to play in the routine day to day work of all businesses (not just those in the film and TV industries). Computerised accounting, production control tools, such as network analysis, the analysis of market research data, and perhaps more controversially, sophisticated information dissemination and retrieval services may now be feasible.

THE ACCUMULATIVE EFFECT

Putting all of these aids together, it becomes apparent that the computer might be considered the next step in film making comparable to sound and colour. Unlike sound and colour, which brought film closer to reality, the computer offers a tool to explore the 'unreality' of conceptual worlds. It will help regenerate an industry where more than ever, artistic questions get technical answers, and perhaps pose the question of whether film making is a valid subject for research and development as part of the Communications industry.

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March 1977

Inside View

COMPUTERS IN FILM-MAKING

by STAN HAYWARD

The Computer Studio Ltd., London

Numerous developments in computer aided design (CAD), microfilm processing, video techniques, copying machines, numerical control (computer controlled machines), transmission of data, image projection, etc., have come about for the end of moving more information faster and cheaper. The developments themselves have specific ends quite unrelated to each other, but the means are usually numerical and consistent with data processing methods.

The policy of the recently-formed Computer Studio - which brings together film, computer and animation expertise - is to evaluate such developments in the light of conventional film-making techniques, and look for optimal systems. The trend in information processing is for written phrases to be symbolised, symbols to become diagrams, and diagrams to become moving pictures... etc., through to adding colour, sound, 3-D, and multiple images. In effect it looks possible that future information will all end up either in a computer or a film of some sort. Systems compatible with both stand to gain.

Given a total system for making a film, the packaging, storing, distribution, and screening of such a film become very much a logical extension of this. The characteristic sounds, colours, and shapes, of electronically produced data is an unexplored dimension that opens up to art what mathematics does for science.

Currently, computer uses in film-making fall under five broad headings: Production and Management, Numerical Control, Hard Copy Output, Computer Aided Animation, and Computer Animation.

Production and Management This embraces accounting, scheduling, budget simulation, critical path analysis, stock control, and information retrieval. The data base for such routines are the constants of film-making; these include fixed rates of wages, equipment and services hire, fees, and known time intervals for events. Added to these are the variables in time, quality, and quantity: these are based on experience. The computer uses this data to estimate, predict, and suggest alternatives within the permitted constraints.

Over a period this information becomes accumulative, embodying the experience of all involved. This offers a valuable source for predicting similar productions.

Numerical Control Where a process or operation can be described in numbers, NC methods make automation possible. The trend in film-handling is towards this because many operations like shooting, processing, printing, editing, dubbing and projecting all use frame-number references to some degree. Conventional machines for handling film are usually 'dedicated' (that is, single-purpose) because all the film operations are discrete steps done in separate times and locations; though in theory a master tape could carry enough information to operate all these machines through from beginning to end. The trend to build dedicated machines for film will continue, but is less likely in videotape where all the operations are in-house and tie up very expensive equipment at all times.

Numerical control of video equipment as a total process will be a minor revolution. Apart from optimising the facilities, it offers a use for the overnight down-time of video studios, and this opens a real revolution: video-animation.

Animation has not changed its technique in principle for over 70 years. It is still a hand-made film and as such becomes increasingly expensive. Also, with demands for fast-changing styles, and a premium on skilled animators, the industry is working at its limits: a boom in educational films will show a deterioration of quality with skills spread so thinly.

In collaboration with Television International in London, Computer Studio is developing a computerised rostrum camera. This will allow cel animation to be shot, coloured, and played back immediately. By eliminating the editing stage, it becomes an instant line-test if the picture has to be put on to film; or it can be the end product if for television format.

Currently the only computerised rostrum camera in UK is at Studio Film Laboratories. An analogue machine, it is several times faster than conventional rostrums, and offers the cameraman a wide range of creative facilities. Leading optical expert on this machine is Rex Neville, whose explorations in camera techniques open up another dimension for animation.

Hard Copy Output Computer aided design (CAD) is already an established industry, and is one that develops almost exponentially as computer companies seek new hunting grounds. Arising from this technique, the three periphery machines with most application to films are:

The CRT (Cathode Ray Tube): A visual display of alpha-numeric (words and numbers) diagrams, and in some cases photos. The hard copy version may be photographed directly off of the tube, or via a photo-copying machine.

The Digitiser: Basically an electronic drawing board attached to a computer. It has a freehand drawing stylus that allows drawings to be made directly, or traced off of prepared artwork. The drawing is automatically digitised (converted to numbers) on a punched tape, and this provides the basic data to be stored or modified by the computer.

The Graph Plotter: The output device for drawings. It produces the finished drawings from the computer after they have been modified (changed in scale, direction, number, perspective, etc). It is complementary to the digitiser.

The combination of these three peripheries exist in a very powerful graphics system developed at the Imperial College. It is the most advanced of its type in the world, and is being further developed as the nucleus of the hypothetical system described at the beginning of this article. We recently produced the animation artwork for a film in four days on this system; by conventional methods, it would have taken three weeks.

Computer Aided Animation By linking the computer output directly to the video tube, it is possible to have live action images modified by the computer. An analogue system developed by Computer Image Co. in the US has an ingenious method of correlating points on an animated figure with those on an actor wearing a harness. The harness has the key points of knees, elbows, shoulders, etc., coded so that a movement of the actor is transcribed into a movement of the animated character. It virtually brings animation down to live action speeds. The system is certainly the most sophisticated of its kind, but being a very expensive dedicated machine will probably be limited in use to high-paying work.

New television tubes are just about to come on the market which use an XY scanning technique (each dot being a co-ordinate of a vertical and horizontal dimension, as against the continuous scanning of existing television tubes). This is completely compatible with computer scanning systems, and opens up an infinite potential for image modification, especially in television tubes designed to take several superimposed inputs.

Computer Animation In spite of 'Auntie BBC's' conservative image, she has been well in the forefront of using computer animation. Over two years ago, producer Ed Goldwyn of the Open University maths programmes decided that the 'Moving Blackboard' technique was a quick and efficient way to produce the mathematically complex; but schematically simple diagrams were needed for the programme.

The films are animated and shot directly by the computer. The input is usually mathematical data. The image is white line on a black background. This can be coloured by shooting the separate elements as 'scenes' - having these coloured optically and marrying the finished prints to produce a multi-coloured picture. This technique, developed at Atlas Computer Laboratory, is being further extended to get tones of line.

Ed Goldwyn's work did two very important things. First it opened the door to the highly specialised but limited market of technical films being made relatively cheaply; and second it created a training ground for a team of programmers to apply themselves to strictly film problems. The team, headed by Bob Hopgood at Atlas, may well be the best of its kind in the world in this field.

The Future Information is the ultimate consumable. It is highly perishable, difficult to evaluate, and always suffers in processing. Anyone who can capture and deliver it quickly, safely, and cheaply, stands to gain rich rewards. *Screen Digest* itself verifies the film-maker's and user's need for better and more information at every level. Technology is banging on the film industry's door with wares such as lasers, videocassettes, stereoscopy, multi-screen, holography, cable vision, colour and sound synthesisers. At the moment a babel of incompatibility exists in the hardware business; the computer offers a common language to supplant this, but it will not supplant it without some governing policy agreed upon by the film industry as a whole.

A feasibility study of the film-making scene prior to setting up Computer Studio made it evident that the film industry as a whole needs rationalising if the talents, facilities, and markets are to be fully exploited. In the light of the impending boom offered by cassettes, and extended television systems, a study in depth is well overdue.

The biggest need now is a clearing house for film technology. It would supply markets and specifications to hardware manufacturers; it would evaluate equipment and services for the film industry; and be a guide to the film user on the state of the art. Above all, it would be a meeting place for the twin cultures - so long engaged; now due to get married.